

PURCHASE DESCRIPTION

WIDEBAND MICROWAVE SIGNAL GENERATOR (50 MHz to 26.5 GHz)

FSNTP-D

1.0 GENERAL This procurement requires an all solid state, synthesized, wideband microwave signal/sweep generator covering a frequency range of 50 MHz to 26.5 GHz and including the ability to measure external power levels.

2.0 CLASSIFICATION The signal generator described herein shall meet the requirements of MIL-T-28800(), Type III, Class 5, Style E, Color R for Navy shipboard, submarine and shore applications with the following modifications and exceptions:

a. The Electromagnetic Interference requirements of MIL-T-28800() are limited to CE03 (broadband limits relaxed 20 dB below 200 kHz), CS01, CS02 (0.05 to 100 MHz), CS06, RE02 (14 kHz to 10 GHz), and RS03.

b. The warm-up time is extended to one hour.

3.0 OPERATIONAL REQUIREMENTS

3.1 Frequency Characteristics

3.1.1 Range: 50 MHz to 26.5 GHz

3.1.2 Resolution: The displayed frequency resolution shall be at least 1 Hz

3.1.3 Accuracy (CW mode): Same as reference standard (3.1.6)

3.1.4 Stability: Less than 1 pp 10⁹/h after one hour warm-up

3.1.5 Spectral Purity (at least the limits specified below)

3.1.5.1 Harmonics/Sub-harmonics: < -40 dBc

3.1.5.2 Non-harmonics/Spurious (≥ 10 kHz from carrier): < -50 dBc

3.1.5.3 Spurious (< 10 kHz from carrier): < -40 dBc

3.1.5.4 Phase Noise: < -70 dBc/Hz at 10 kHz offset from carrier

3.1.5.5 Residual Modulation (CW mode in 50 Hz to 15 kHz detection BW)

3.1.5.5.1 FM: Less than 250 Hz rms

3.1.5.5.2 AM: Less than 0.30% pk

3.1.6 Reference Frequency

3.1.6.1 Internal Reference Output: 10 MHz; > 0.5 Vrms into 50 ohms

3.1.6.2 External Reference Input: 10 MHz; > 0.2 Vrms into 50 ohms

3.1.6.3 External Reference Output: 10 MHz; > 0.5 Vrms into 50 ohms

3.1.7 Frequency Lock Indicator: A light/diagnostic software shall provide indication if output signal loses frequency lock.

3.2 Output Characteristics {L = Output level in dBm}

3.2.1 Range: +10 to -90 dBm (min)

3.2.2 RF Output: Leveled output shall be available at +10 dBm or less

3.2.3 Accuracy: (displayed level vs measured output level)
±1.0 dB from 50 MHz to 18 GHz; ±2.0 dB from 18 to 26.5 GHz [L > -40 dBm]
Additional ±0.2 dB/10 dB step [L < -40 dBm]

3.2.4 Display/Resolution: Digital display / minimum resolution of 0.1 dB

3.2.5 Flatness: ±1.0 dB measured at an output level of +10 dBm

3.2.6 Impedance/Connector: 50 ohms / precision 3.5 mm male or female (SMA compatible)

3.2.6.1 VSWR: Less than 2:1 [L < 0 dBm]

3.2.7 Level Control Indicator: A light/diagnostic software shall provide indication if the output

level control is lost, meaning that the level may no longer be within the accuracy specification of paragraph 3.2.3.

3.3 Modulation Characteristics

3.3.1 Pulse Modulation (internal)

3.3.1.1 Rate: 10 Hz to 1 MHz

3.3.1.2 Width: 0.1 µs to 100 ms

3.3.1.3 Rise/Fall Time: Less than 25 ns

3.3.1.4 On/Off Ratio: Greater than 80 dB

3.3.2 Pulse Modulation (external)

3.3.2.1 Rate: 10 Hz to 1 MHz

3.3.2.2 Width: 0.1 µs to 100 ms

- 10 kHz to at least 2 MHz peak

- 3.3.4.3 FM Accuracy: $\pm 10\%$ [ΔF ≥ 50 kHz]
- 3.3.4.4 Incidental AM: $\leq 0.5\%$ (50 Hz - 15 kHz BW) [ΔF = 20 kHz @ 1 kHz]
- 3.3.4.5 Residual FM (FM mode): ≤ 3000 Hz rms (0.05-15 kHz BW) [ΔF = 0.0 kHz @ 1 kHz]
- 3.3.4.6 Display/Resolution: Digital display FM Dev and Rate/3 digit min (floating point)
- 3.3.5 External FM
 - 3.3.5.1 Rate: At least 10 Hz to 2 MHz [3 dB BW]
 - 3.3.5.2 FM Deviation: 10 kHz to at least 100 kHz peak [F ≤ 100 MHz]
10 kHz to at least 1 MHz peak [100 ≤ F ≤ 500 MHz]
10 kHz to at least 2 MHz peak [F ≥ 500 MHz]
 - 3.3.5.3 FM Accuracy: $\pm 10\%$ [ΔF ≥ 50 kHz]
 - 3.3.5.4 Distortion: $\leq 5\%$ [300 kHz dev at 50 kHz]
 - 3.3.5.5 Sensitivity: 1 Vpk/1 MHz deviation

3.4 Analog Sweep Characteristics

- 3.4.1 Analog Sweep (ΔF = peak sweep offset about CF)
 - 3.4.1.1 Frequency
 - 3.4.1.1.1 Range: 50 MHz to 26.5 GHz
 - 3.4.1.1.2 Resolution (Start/Stop/CW): At least 1 kHz
 - 3.4.1.2 Functions: Start/Stop, CW, CF-ΔF, Marker
 - 3.4.1.3 Sweep Trigger: Internal (automatic), External, Single, Manual
 - 3.4.1.4 Frequency Markers: At least 5; both amplitude and frequency
 - 3.4.1.5 Sweep Rate/Time: At least 300 MHz/msec / 30 msec to 99 sec
 - 3.4.1.6 Ramp Output: 0 to 10 volts, proportional to the frequency between selected sweep limits
 - 3.4.1.7 Display: Digital
 - 3.4.1.7.1 Resolution:
 - 3.4.1.7.1.1 Start/ Stop / CF: 1 kHz min
 - 3.4.1.7.1.2 ΔF / Marker / Sweep Time: At least 3 digits min (floating point)
 - 3.4.1.8 Output Flatness: Within ± 1.0 dB to 18 GHz; ± 2.0 dB from 18 to 26.5 GHz
 - 3.4.1.9 Pen Lift: TTL compatible output, high level during retrace

3.5 Power Meter

- 3.5.1 Frequency Range: 50 MHz to 26.5 GHz
- 3.5.2 External Measurement Range: +10 dBm to -30 dBm
- 3.5.3 Accuracy (indicated power level vs externally measured level):
±1.0 dB (+10 dBm to -10 dBm); ±2.0 dB (-10 dBm to -30 dBm)
- 3.5.4 Display (digital): 3.5 digits min
- 3.5.4.1 Resolution: 0.1 dB min for all power readings
- 3.5.5 Input Connector: Precision 3.5 mm male or female (SMA compatible)

4.0 GENERAL REQUIREMENTS

- 4.1 Power 115/230 Vac ±10% single phase 50, 60 or 400 Hz, 350 watts max
 - 4.2 Lithium Batteries Per MIL-T-28800, lithium batteries are prohibited without prior authorization. Requests for approving the use of lithium batteries, including those encapsulated in integrated circuits, shall be submitted to the procuring activity at the time of submission of proposals. Approval shall apply only to the specific model proposed.
 - 4.3 Volume Less than 65,548 cm³ (4,000 in³)
 - 4.4 Weight Less than 29.55 kg (65 lb)
 - 4.5 Calibration Interval The calibration interval shall be at least 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a 72% or greater confidence factor following a calibration interval of 12 months.
 - 4.6 Remote Control The generator shall be capable of being remotely controlled via the IEEE-488 interface bus, operating as both a talker and listener, having at least the following subset of bus functions: AH1, L4, SH1, T6, SR1, DC1 and RL1. Control of the following parameters is required:
 - Output Frequency
 - Output Amplitude (-99 to +10 dBm)
 - Pulse/AM/FM
 - External Power Measure
 - Sweep Function
- 5.0 ACCESSORIES The following list of accessories shall be provided with each equipment:

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- 5.1 One Gore-tex GMCA 190-1265 or equivalent coaxial cable, 6 ft long, with male precision 3.5 mm SMA compatible connectors or equivalent on each end
- 5.2 One Gore-tex GMCA 190-1265 or equivalent coaxial cable, 18 in long, with male precision 3.5 mm SMA compatible connectors or equivalent on each end
- 5.3 One male to female adapter with precision 3.5 mm SMA compatible connector or equivalent
- 5.4 One female to female adapter with precision 3.5 mm SMA compatible connector or equivalent